interferometric far-field confocal microscope such as described in cited U.S. Patent No. 5,760,901 wherein the phase masks are removed. In the another embodiment, beam-conditioner **22** is configured as the two-frequency generator and phase-shifter such as described in cited U.S. Provisional Patent Application No. 60/442,858 (ZI-47) and cited U.S. Patent Application No. 10/765,368 filed Jan. 27, 2004 (ZI-47) entitled "Apparatus and Method for Joint Measurements of Conjugated Quadratures of Fields of Reflected/Scattered and Transmitted Beams by an Object in Interferometry." The mismatch in indices of refraction at the substrate surface and adjacent medium are compensated by the procedure described herein with respect to Fig. **1c**..

Another embodiment wherein effects of a mismatch in indices of refraction at the substrate surface and adjacent medium are compensated comprises the interferometer system of the first embodiment with interferometer **10** comprising an interferometric far field confocal microscope such as described in U.S. Patent Application No. 09/526,847 entitled "Multiple Layer Confocal Interference Microscopy Using Wavenumber Domain Reflectometry And Background Amplitude Reduction And Compensation" by Henry A. Hill, the contents of which are herein incorporated in their entirety by reference. In the another embodiment, two frequency generator and beam-conditioner **22** is configured as the two-frequency generator and phase-shifter such as described in cited U.S. Provisional Patent Application No. 60/442,858 (ZI-47) and cited U.S. Patent Application filed Jan. __, 2004 (ZI-47) entitled "Apparatus and Method for Joint Measurements of Conjugated Quadratures of Fields of Reflected/Scattered and Transmitted Beams by an Object in Interferometry." The mismatch in indices of refraction at the substrate surface and adjacent medium are compensated by the procedure described herein with respect to Fig. **1c**..

Another embodiment wherein effects of a mismatch in indices of refraction at the substrate surface and adjacent medium are compensated comprises the interferometer system of the first embodiment with interferometer **10** comprising an interferometric far-field confocal microscope such as described in cited U.S. Patent Application Serial No. 09/526,847 wherein the phase masks are removed. In the another embodiment, beam-conditioner **22** such as described in cited U.S.

U.S. Patent Application No. 09/917,402 (ZI-15) entitled "Multiple-Source Arrays for Confocal and Near-field Microscopy" by Henry A. Hill and Kyle Ferrio of which the contents thereof are included herein in their entirety by reference. A nonlimiting example of a pinhole array for pinhole-array beam-splitter **12** is shown in Fig. **1c** having a spacing between pinholes of b with aperture size a.

The thickness e and index of refraction n_4 of compensating layer **50B** (see Fig. **1c**) are selected in relation to the index of refraction of convex lens **50A**, the index of refraction of substrate **60**, and the depth of a section in substrate **60** that is being imaged.

Input beam **24** is reflected by mirror **54** to pinholearray beam-splitter **12** where a first portion thereof is transmitted as reference beam components of output beam components **30A** and **30B** and a second portion thereof scattered as measurement beam components of beam components **26A** and **26B**. The measurement beam components of beam components **26A** and **26B** are imaged as components of beam components **28A** and **28B** to an array of image spots in an image plane close to the surface of substrate **60**. A portion of the components of beam components **28A** and **28B** incident on substrate **60** are reflected and/or scattered as return measurement beam components of beam components **28A** and **28B**. Return measurement beam components of beam components **28A** and **28B** are imaged by catadioptric imaging system **10** to spots that are coincident with the pinholes of pinhole-array beam-splitter **12** and a portion thereof is transmitted as return measurement beam components of output beam components **30A** and **30B**.

The description of the imaging properties of catadioptric imaging system **10** is the same as the corresponding portion of the description given for the imaging properties of catadioptric imaging system **10** in cited U.S. Provisional Patent Application No. 60/442,982 (ZI-45) and U.S. Patent Patent No. 7,084,983 ~~Application~~ filed Jan. 27 __, 2004 entitled "Interferometric Confocal Microscopy Incorporating Pinhole Array Beam-Splitter".

The next step is the imaging of output beam components **30A** and **30B** by imaging system **110** to an array of spots that coincide with the pixels of a multi-pixel detector such as a CCD to generate an array of electrical interference signals **72**. The array of electrical interference signals is transmitted to signal processor and controller **80** for subsequent processing.

method, by two pixels of detector **70** for the quad-homodyne detection method, and by four pixels of detector **70** for the double-homodyne detection methods. In the second mode for the acquisition of the electrical interference signal values, each corresponding set of four electrical interference signal values are generated by a conjugate set of four different pixels of detector **70** for each of the four homodyne detection methods. Thus in the second mode of acquisition, the differences in pixel efficiency and the differences in sizes of pinholes in pinhole-array beam-splitter **12** need to be compensated in the signal processing by signal processor and controller **80** to obtain conjugated quadratures of fields of return measurement beam components.

The advantage of the second or scanning mode is that the electrical interference signal values are acquired in a scanning mode that increases throughput of the interferometric confocal microscopy system.

The description of source **18** and beam-conditioner **22** is the same as corresponding portions of the description given for the source and beam-conditioner described in cited U.S. Provisional Patent Application No.60/442,982 (ZI-45), U.S. Patent Application filed Jan. 27, 2004 (ZI-45) entitled "Interferometric Confocal Microscopy Incorporating Pinhole Array Beam-Splitter," U.S. Provisional Patent Application No. 60/442,858 (ZI-47), and U.S. Patent Application No. 10/765,368 filed January 27, 2004 entitled "Apparatus and Method for Joint Measurements of Conjugated Quadratures of Fields of Reflected/Scattered and Transmitted Beams by an Object in Interferometry."

Reference is made to Fig. **1d** where beam-conditioner **22** is first described generally as a two-frequency generator and a frequency-shifter. Beam-conditioner **22** may be operated to generate a beam **24** that has either a frequency-shifted, single frequency component or two frequency-shifted components.

Beam-conditioner **22** comprises acousto-optic modulators **1120, 1126, 1130, 1132, 1142, 1146, 1150, 1154, 1058,** and **1062**; beam-splitter **1168**; and mirror **1166**. Input beam **20** is incident on acousto-optic modulator **1120** with a plane of polarization parallel to the plane of Fig. **1d**. A first portion of beam **20** is diffracted by acousto-optic modulator **1120** as beam **1122** and then by acousto-optic modulator